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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/542,061	04/03/2000	Erik R. Thoen	01997-270001	4229

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EXAMINER

MENEFEE, JAMES A

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/542,061	THOEN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	James A. Menefee	2828	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.


- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 July 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

  
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**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 23 July 2003 has been entered.

### ***Response to Amendment***

In response to the amendment filed 23 July 2003 claims 1, 4, 10-11, 20-21, 26, 29, and 31-33 are amended. Claims 1-35 are pending.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of the independent claims (1, 10, 20, 26, and 32) is claiming a semiconductor element that exhibits certain properties. However, there is no structure in the claims to suggest that the element will have these properties. It is unclear how the semiconductor element can operate with such properties, absent any structure to support their existence. Currently, the only

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structure of the semiconductor element is that it is a semiconductor element. Obviously, numerous semiconductor elements will not exhibit such properties. The applicant needs to define structure in the claims so that such properties will be exhibited.

The dependent claims are rejected for depending on the rejected base claims.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 8, 10-11, 26-30, are rejected under 35 U.S.C. 102(b) as being anticipated by Spuhler (previously cited, Electronics Letters, 1 April 1999). Relevant portions of Spuhler are the entire document, especially Fig. 1-2. See the marked up copies of Fig. 1-2 from the previous office action to go along with the reference numbers mentioned below.

**Independent Claims:**

Regarding claim 1, Spuhler discloses a laser system 10 that produces radiation at an operative wavelength, the system defining a laser cavity. The system comprises a mode-locking element 20 configured to mode-lock the output of the laser system, and a semiconductor element 30.

Regarding claim 10, there is disclosed a laser system 10 defining a laser cavity and comprising a pump 11, a gain medium 12 that produces radiation when pumped by the pump 11, and a reflector 13 disposed along an optical path in the cavity, the reflector comprising one or

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more layers of a 1<sup>st</sup> semiconductor material 20 acting as saturable absorber, and one or more layers of a 2<sup>nd</sup> semiconductor material 30.

Regarding claim 26, there is disclosed a method of enhancing the stability of a cw mode-locked output of a laser 10, the method comprising passively mode-locking the output of a laser 10 to achieve a continuous train of pulses and stabilizing the pulses by incorporating a semiconductor element 30.

It is not explicitly disclosed that the semiconductor element of Spuhler produces increasing absorption of radiation as energy density of radiation at the surface of the semiconductor element increases. But, when the structure recited in the prior art is substantially identical to that shown in the claims, claimed properties or functions are presumed to be inherent. As the structures are the same, it is presumed that the semiconductor element will produce these properties.

#### Dependent Claims:

Regarding claims 2, 11, and 29, it is not explicitly disclosed that the semiconductor element exhibits two-photon absorption, but when the structure recited in the prior art is substantially identical to that shown in the claims, claimed properties or functions are presumed to be inherent. As the structures are the same, it is presumed that the semiconductor element will exhibit two-photon absorption.

Regarding claims 3 and 30, there is further disclosed a reflective structure 13 disposed along an optical path in the cavity, where the semiconductor element 30 comprises one or more layers of the material disposed on the reflective element.

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Regarding claims 8 and 28, the mode-locking element 20 is a saturable absorber that passively mode-locks the system.

Regarding claim 27, the stabilizing step includes stabilizing the continuous train against Q-switched mode locking (p. 568, col. 2, 1<sup>st</sup> new par.).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-5 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spuhler in view of Kosah (previously cited US H1177). Spuhler discloses all of the limitations of claims 1, 3, and 26, but does not mention that the semiconductor material exhibits sufficient free carrier absorption to produce nonlinear increasing loss. Kosah teaches that free carrier absorption is a cause of non-linear effects in an optical system (col. 2 lines 31-62). It would have been obvious to one skilled in the art to have semiconductor material that initiates free carrier absorption so that the optical nonlinear effects (i.e. nonlinear increasing loss) that are inherently present in Spuhler can be controllable, as taught by Kosah.

Claims 6 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spuhler. Spuhler discloses the limitations of claims 1-3, 8, 10-11, and 26-30, but does not disclose the following:

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Regarding claims 6 and 19, it is not disclosed that the semiconductor layer be part of a transmissive structure, or more particularly a reflector having a resonant or AR coating. It would have been obvious to one skilled in the art to include an AR coating on the reflector, and therefore make the semiconductor layer part of a transmissive structure, in order to help reduce loss caused by feedback in the cavity due to unwanted reflection on that end of the reflector, as is well known.

Regarding claim 15, it is not disclosed that the 2<sup>nd</sup> semiconductor be InP, rather that it should be GaAs. However, InP and GaAs are art known substitutes as using one or the other will not significantly change the operation of the device, therefore it would have been an obvious substitution for one skilled in the art to use InP over GaAs.

Regarding claim 16, it is disclosed that the 1<sup>st</sup> semiconductor (i.e. the quantum wells of Fig. 1) comprises InGaAs.

Regarding claim 17, the gain medium is an Er/Yb waveguide (title, abstract).

Regarding claim 18, it is disclosed that the reflector comprises a Bragg mirror, rather than a dielectric mirror. However, these items are art known substitutes as using either will not significantly change the overall operation of the device, therefore it would have been an obvious substitution for one skilled in the art to use a dielectric mirror rather than a Bragg mirror.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spuhler in view of Jacobovitz-Veselka (previously cited US 5,278,855). Spuhler discloses all of the limitations of claim 1, but does not mention that the system is tunable to produce radiation over a range of wavelengths. Jacobovitz-Veselka teaches that it is known to produce mode locked lasers in

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tunable systems (col. 3 lines 17-38). It would have been obvious to one skilled in the art to make the system tunable as it is often important to be able to change the lasing wavelength over a range of wavelengths, as is well known.

Claims 9, 20-25, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spuhler in view of Shen (previously cited US 5,764,679).

Independent Claims:

Regarding claim 20, Spuhler discloses a laser system 10 comprising a pump 11, a gain medium 12 that produces radiation when pumped by the pump, a mode-locking element 20, and a structure disposed along the optical path of the cavity comprising a semiconductor material.

Regarding claim 32, Spuhler discloses a method comprising mode-locking a laser to produce a train of pulses, and incorporating a semiconductor element into the cavity of the laser limiting peak intensity of the pulses.

It is not explicitly disclosed that the semiconductor element of these claims produces the properties as claimed, but when the structure recited in the prior art is substantially identical to that shown in the claims, claimed properties or functions are presumed to be inherent. See the 102 rejections above.

It is not disclosed the use of active mode locking rather than passive mode locking. Shen teaches that active mode locking is conventionally done using an outside modulation source, and also that active mode locking can generate pulses with small timing jitter (col. 1 lines 14-40). It would be obvious to one skilled in the art to use active mode locking rather than passive mode locking because of the smaller jitter obtained, as taught by Shen.



Dependent Claims:

Regarding claim 9, it is not disclosed that the mode locking element performs active mode-locking. Shen teaches that active mode locking is conventionally done using an outside modulation source, and also that active mode locking can generate pulses with small timing jitter (col. 1 lines 14-40). It would have been obvious to one skilled in the art to use active mode locking rather than passive mode locking because of the smaller jitter obtained, as taught by Shen.

Regarding claim 21, it is not explicitly disclosed that the semiconductor element exhibits two-photon absorption, but when the structure recited in the prior art is substantially identical to that shown in the claims, claimed properties or functions are presumed to be inherent. As the structures are the same, it is presumed that the semiconductor element will exhibit two-photon absorption.

Regarding claim 22, it is disclosed that the semiconductor material is part of a reflector.

Regarding claim 23, it is disclosed that the structure comprises a waveguide.

Regarding claim 24, it is disclosed that the structure comprises a waveguide.

Regarding claim 25, it is not disclosed that the semiconductor material comprise InP or that the semiconductor material be an Er doped fiber. It is disclosed that the laser comprise Er doped glass and the semiconductor material comprise GaAs. These two pairs each contain art known substitutes as using one or the other will not significantly change the operation of the device, therefore it would have been an obvious substitution for one skilled in the art to use InP over GaAs and Er doped fiber over Er doped glass.

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Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spuhler in view of Feuer (previously cited US 6,078,597). Spuhler discloses all of the limitations of claims 10-11 but does not mention that when light is incident on the reflector a standing wave is formed, said standing wave having local maximum in the first or second semiconductor layers. Feuer teaches a reflector with a saturable medium adjacent to it, similar to Spuhler's. When light is incident on the reflector a standing wave is formed with local maxima in the saturable absorption area (col. 2 lines 12-24, col. 3 lines 40-51). It would have been obvious to one skilled in the art to include such a reflector in Spuhler's system because a reflector that produces local maxima in such a way can help to eliminate noise, as taught by Feuer. It would be obvious to one skilled in the art that should Feuer include a second semiconductor section then the maximum may be located in that area for the same reasons.

#### ***Response to Arguments***

Applicant's arguments filed 23 July 2003 have been fully considered but they are not persuasive. Applicant made the following arguments:

Applicant's arguments are based on the assertion that the semiconductor element of Spuhler does not exhibit the same claimed properties as the semiconductor element of the claims, and thus the Spuhler reference does not disclose the claimed invention. However, as noted in the 112 rejection above, the applicant has not defined any structure supporting the existence of these properties. Claimed properties or functions cannot be used to distinguish a claim from the prior art. Where the claimed and prior art products are identical or substantially identical in structure or composition, a *prima facie* case of either anticipation or obviousness has been established. *In*

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*re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). The only claimed structure of the semiconductor element is that it is a semiconductor element. Spuhler discloses a semiconductor element. Thus, the claimed structures are identical. Obviously many semiconductor elements will not exhibit such properties, but the applicant has failed to structurally distinguish the claimed semiconductor element from such other semiconductor elements. If the applicant wishes to distinguish from Spuhler, then structure must be added to the claims to distinguish the semiconductor element of the claims from the semiconductor element of Spuhler. Arguing that Spuhler does not disclose the properties is not enough; the structures must be distinguishable.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (703) 605-4367. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
JM

September 23, 2003

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